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Determining distance education students' readiness for mobile learning at University of Ghana using the Theory of Planned Behavior

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ABSTRACT

The use of mobile technologies in the classroom is transforming teaching and learning in higher institutions. This study investigated University of Ghana Distance Education students' perceptions toward mobile learning. The paper using the Theory of Planned Behavior (TPB) explained how students' beliefs influenced students' intention to adopt m-learning. Findings from the study showed that most of the students had mobile phones, and used them for conversation and texting. Young students were more likely to have smart phones that their older colleagues. Factor analysis was further conducted which showed strong loadings of factors such as intentions and perceived behavioral control confirming that the TPB explained the students' m-learning readiness very well. Thus, attitude, subjective norm and behavioral control influenced students' intention to adopt m-learning. The results provide valuable information on ways to implement m-learning programs incorporating the voice and needs of students.

Keywords: *m-learning; m-readiness; higher education; m-learning adoption; technology*

INTRODUCTION

Distance education globally has witnessed significant transformation because of the Internet. Today one can talk about the shift from e-learning (learning supported by digital "electronic" tools and media) towards m-learning (e-learning using mobile devises and wireless transmission) (Keegan, 2002; Sharma and Kitchens, 2004). Globally, the penetration of mobile phone and devices have transformed teaching and learning in several universities in both developed and developing countries. Mobile-cellular penetration rates stand at 96% globally; 128% in developed countries; and 89% in developing countries (International Telecommunication Union, 2013). As observed by Jacob and Isaac (2008) "wherever one looks, the evidence of mobile penetration is irrefutable: cell phones, PDAs, MP3 players, potable game devices, handhelds, tablets and laptops."

In spite of country differences in mobile phone penetration, there is an inexorable evidence in Africa and elsewhere of a high rate of use of mobile phones by young people in our universities (Brown, 2008; Koszalka and Ntloedibe-Kuswani, 2010; Porter et al. 2012; Makoe, 2012). This high rate of adoption of mobile phones by young people has far-reaching implications for the transformation of teaching and learning and the way distance education programs could be offered by universities in Ghana. That is why effort by the University of Ghana to launch the University of Ghana Integrated Digital Mobile Learning Platform for Distance Education (IDMP) ought to be seen as a worthwhile gesture. This m-learning program will provide distance education students with an internet enabled mobile tablet device pre-loaded course materials and other applications (University of Ghana, 2012).

As the University of Ghana plans to introduce m-learning into its Distance Education program, some writers have argued that m-readiness surveys should precede the adoption of m-learning by students (Abas, 2009; Mahat, Ayub and Wong, 2012). Determining the m-readiness of students allows university administrators to listen to the voices of students (Abas, 2009; Mahat,

Ayub and Wong, 2012) and to incorporate voices of students in the planning and implementation of m-learning to ensure the acceptance and use of the mobile technology by the students. Although some studies have been done on m-learning in Ghana, most of the studies lack strong theories to explain students' m-readiness (Annan, Ofori-Dwumfuo and Falch, 2012; Asabere, 2012; Asabere, Enguah and Mends-Brew, 2012). Furthermore these studies do not focus on m-readiness of students in Distance Education programs. What this study attempts to do is to use the Theory of Planned Behavior (TPB) to examine factors that university Distance Education students consider as important in the adoption of m-learning and also explain the relationship among these factors. The relevance of TBP is based on the fact that students' readiness to use m-learning would be based on intention which would influence their behavior. But TBP does not only establish the intention-behavior relationship, it also explains how other factors such as attitudes, subjective norm and perceived behavior control are mediated by intention. Ajzen (2011, cited in Kautonen, Gelderen & Fink, 2013, p. 2) defines intention as "a person's readiness to perform a given behavior." The TBP postulates that intention devoid of unforeseen circumstances that limit individual control, helps predict future behavior (Carmack and lewis-Moss, 2009).

DISTANCE EDUCATION AND MOBILE TECHNOLOGIES

Distance education has always grown on the wings of technology. Several scholars have traced the evolution of the impact of technologies on distance education since its inception (Garrison, 1985; Taylor, 1995; Taylor & Swannell, 2001; Schultze, 2011). The first generation described as the era of correspondence courses was driven by the print technology. The second era was characterized by limited media courses (postal mailing, strengthened with audiotape and television broadcast). The third phase was driven by the personal computer and based on multimedia applications such as print, audio and video-conferencing which offer synchronous communication (Garrison, 1985; Taylor, 1995; Taylor & Swannell, 2001; Anderson and Dron, 2011; Schultze, 2011). The fourth phase traced to the influence of the Internet is based on the use of world-wide web (www) to provide both synchronous and asynchronous delivery (e-learning) and recently m-learning (Taylor, 1995; Taylor and Swannell, 2001; Anderson and Dron, 2011). The growth of m-learning in teaching and learning credence to the statement by Keegan (2002, p. 8) that 'Mobile learning is a harbinger of the future of learning' and that the "future is wireless" Keegan (2005 cited in Zawacki-Richter, Brown and Delport, 2008). Stockwell (2008, p. 254) has noted that "many see mobile learning as the next generation of learning, one that is to be readily embraced by the learners using technologies that most already possess."

MOBILE LEARNING

The definition of m-learning has come in different shades and forms since its evolution (Kukulska-Hulme, 2009). These definitions have ranged from *technology oriented to e-learning oriented and to location oriented* and *learner-centered* (Winters, 2006; Fotouhi-Ghazvini, et al. 2010; Cheung, 2012) where mobile learning is defined in the context of the use of handheld electronic devices such as a PDA, mobile phone, iPod, PC Tablets, etc., for educational activities in and outside the classroom to critical areas such as context (learning) and social connectedness (Kukulska-Hulme, Sharples, Milrad, Arnedillo-Sanchez, and Vavoula, 2009). One often cited definition of mobile learning in this context is the one offered by O'Mailley, et al (2003, p.6) as: "Any sort of learning that happens when the learner is not at a fixed, predetermined location, or learning that happens when the learner takes advantage of the learning opportunities offered by mobile technologies." This learning could occur in context and culture and also "everywhere at every time without permanent physical connection to cable networks. This can be achieved by the use of mobile and portable devices…" Georgiev, Georgieva and Smrikarov (2004, p. 2).

Pouezevara (2012) has argued that what separates m-learning from e-learning in the learner-centric perspective is the spontaneity of learning and the way learning becomes context-specific through the interaction between the learner, device, and the environment. A similar view has been expressed by Kukulska-Hulme et al. (2009) that mobile technologies lend themselves to personalized, situated, authentic and informal learning. Naismith et al. (2005) have identified various types of learning that emerge through the use of mobile technologies. These are: behaviorist learning, constructivist learning, collaborative learning, situated learning and informal learning.

Behavioral learning is described by Naismith et al. (2005) as one that is facilitated through reinforcement of an association between a particular stimulus and a response. In the case of m-learning, problems (stimulus) are presented to students who find solutions (response) to the problems. Feedback from the system provides reinforcement. Constructivist learning occurs when students construct new ideas or concepts with mobile devices based on their current and past knowledge (Naismith et al. 2005). Situated learning posits that learning can occur in authentic context (Naismith et al. 2005). A situated learning environment provides students the opportunity to interact appropriately with their environment, using mobile technologies by accessing information about the environment and gathering information from it (Jeng, et al. 2010). Collaborative learning emphasizes activities that promote learning through social interaction. Through conversations and peer support through peer group learning, students are able to share ideas and new knowledge and also create new collaborative learning groups. Informal learning is learning that occurs outside the formal curriculum. Students learn from varied sources outside the formal institutions and these learning sources are incorporated into the classroom situation (Niasmith et al., 2005).

As mobile learning technologies become ubiquitous in the classroom, more attention is being focused on the learning experiences that occur between students, teachers and the devices. As argued by Kukulska-Hulme et al (2009), these learning experiences transcend spatial, temporal and/or conceptual borders and involve interactions with fixed and mobile technologies. Naismith et al. (2005) explicate that as learning moves more and more outside of the classroom and into the learner's setting, both real and virtual, learning will become more situated, personal, collaborative and lifelong.

For distance education, Kukulska-Hulme (2007) has noted three critical reasons why m-learning is very important. These are: (a) improving access, (b) exploring the potential for changes in teaching and learning, and (c) aligning with wider institutional or business aims. For distance education students, they need to be able to perform tasks such as studying the course material, making notes, writing assignments, accessing a forum, sending and receiving e-mail, and communication with tutors (Kukulska-Hulme, 2007). Using mobile technologies in distance education could offer more flexibility to students (Ally, 2005). Indeed, Ally (2005) has explained that introducing m-learning into distance education programs may require organizational change and meticulous planning: converting existing course modules and new ones developed; putting in place a telecommunication infrastructure; training of staff and faculty; and provision of mobile devices to students.

The provision of mobile devices and which of the devices could be described as portable has become a point of discussion. Caudill (2007) points to hardware advances as one of the two key components to the emergence of m-learning, the other being networking. Caudill (2007) further explicate that to be described as a mobile technology, that hardware must be easy to carry around and people can easily accessed the hardware on a regular basis. Some of the devices which fall within this categorization are mobile phones, PDAs, and MP3 players. The second component contributing to the emergence and success of m-learning mentioned by Caudill is wireless networking. While some of the devices could operate in a non-networked, offline

environment, several of these devices depend on access to the Internet to trade information and access up-to-date information (Caudill, 2007). Although some writers do not categorize laptop and notebook computers as mobile devices (Traxler, 2007; Caudill, 2007), recently, there has been some consensus on which devices could pass as mobile technologies. These devices include laptop/PC tablets, smartphones, MP3 players, iPods, USB drive, e-book reader, and even wearable devices (Sharples, Taylor, Vavoula, 2007; Trifonova, Georieva and Ronchetti 2006; Corbell and Valdes-Corbell, 2007; Peters, 2007; Zawacki-Richter, Brown and Delport, 2008; Cavus, 2010).

THEORETICAL FRAMEWORK

Few researchers have studied students' m-learning in higher education (Lu and Viehland, 2008; Liu, Li and Carlsson, 2010; Park, Nam and Cha, 2012; Cheon, Lee, Crooks and Song, 2012). Apart from the paucity of research, very few researchers have used the Theory of Planned Behaviour in explaining students' m-readiness in universities (Cheon, Lee, Crooks and Song, 2012) in Ghana. The theory planned behavior (TPB) is an extension of the theory of reasoned action (TRA) made "necessary by the original model's limitations in dealing with behaviors over which people have incomplete volitional control" (Ajzen, 1991, p. 181).

According to Bamberg, Ajzen and Schmidt (2003), the theory of planned behavior is guided by three considerations: beliefs about likely consequences of the behavior (behavioral beliefs), beliefs about the normative expectations of others (normative beliefs), and beliefs about the presence of factors that may further or hinder performance of the behavior (control beliefs). They further posit that behavioural beliefs create a favorable or unfavorable attitude toward the behavior. Indeed, Armitage and Conner (2001, p. 474) have observed that "the more favorable the attitude towards the behavior, the stronger should be the individual's intention to perform it." Normative beliefs result in perceived social pressure or subjective norm.

Subjective norm is about individual's perceived expectation that significant others want them to perform a behavior in question (Haggar and Chatzisarantis, 2005). If students perceive that other students endorse (or disapprove of) the use of mobile devices, they are more or less likely to intend to use them (Conner and Armitage, 1998; Armitage and Conner, 2001). The study measured normative beliefs as students' perception toward the extent to which significant other and students were in favor of using m-learning in their courses (Cheon et al. 2012, p. 1057). Although Cheon et al. (2012) used two referent groups, that is, peer students and instructors; we dropped the instructor group in this study. So we proposed that normative beliefs of peer students as the antecedent of subjective norm and as a single item measure (Conner and Amitage, 1998; Amitage and Conner, 2001).

Control beliefs which give rise to perceived behavioral control has to do with the perceived ease or difficulty with behavior (Ajzen, 2012). Ajzen (1991) has argued that the resources and opportunities available to students are critical in dictating the likelihood of use of mobile devices. Ajzen (1991) further argued that perceived behavioral control is akin to Bandura's (1977 cited Ajzen, 1991) concept of perceived self-efficacy which is "concerned with judgments with how well one can execute courses of action required to deal with prospective situation" (cited in Ajzen, 1991, p. 184). Indeed, the significance of self-efficacy in the study is that, a person's behavior is influenced by his/her confidence in his/her ability to do something.

Hagger and Chatzisarantis (2005) have noted that recent studies have shown that it is possible to differentiate two subcomponents of perceived behavioral control: the extent that an individual has access to the means to exert control over the target behavior, termed perceived controllability (Ajzen, 2002); and an individual's situation-specific self-confidence for engaging in the behavior,

labelled self-efficacy (Armitage and Conner, 2001). Hagger and Chatzisarantis (2005) have explained that it is critical that measures of controllability focus on statements of subjective control an individual may have over the target behavior, while self-efficacy should focus on statements that refer to the perceived abilities and capacities of the actor toward participating in the target behavior. In relation to m-learning, this study adopts the position of Cheon et al. (2012) by measuring perceived behavioral control using the two constructs: self-efficacy and learner autonomy. According to Choen et al. (2012, p. 1057) "self-efficacy refers to the judgment of general ability to perform a behavior, while learner autonomy is the extent to which students are responsible and have control over the process of learning with mobile devices."

Ajzen (1991) has explained that apart from attitudes, subjective norms and perceived behavioral control, a central factor in the theory of planned behavior is the individual's intentions to perform a given behavior. Ajzen (2012, p. 19) has argued that "fundamental to the theory of planned behavior is the idea that behavior is guided by intentions." Ajzen (1991) further posit that "intentions are indications of how hard people are willing to try, of how much of an effort they are planning to exert, in order to perform the behavior." In combination, attitude toward the behavior, subjective norm, and perception of behavioral control leads to the formation of a behavioral intention (Davis, Ajzen, Saunders and Williams, 2002; Bamberg, Ajzen and Schmidt, 2003; Ajzen, 2012).

As a general rule "the more favorable the attitude and subjective norm, and the greater the perceived control, the stronger should be the person's intention to perform the behavior in question" (Davis et al. 2002, p. 811). When we apply the theory of planned behavior to students' m-learning readiness, the theory suggests that intentions to adopt m-learning together with attitudes, subjective norms and perceived behavioral control, predict the likelihood that students will be more willing to use m-learning in their studies (Davis et al. 2002). In this study since the students have not started using the mobile devices, their intentions to use the devices should they be introduced becomes a strong determinant in the study.

The model proposed in this study includes the use of TAM's perceived ease of use and perceived useful which directly affect attitude toward use (Cheon et al. 2012). That is, students' perceived ease of use m-learning would positively influence their attitude towards m-learning, while students' perceived usefulness of m-learning would positively influence their attitude toward m-learning. Indeed, it has been established that attitude and perceived use predict individual's behavior intention to use a technology (Lee, 2006). In this study, the perceived ease of use of m-learning is defined as "the degree to which students believe that using m-learning will be free of effort" (Davis, 1989). The perceived usefulness of m-learning is defined as "the degree to which the user believes that using m-learning would enhance his/her learning performance" (Davis, 1989).

METHODS

The population comprised all students of the University of Ghana Distance Education program. The University of Ghana Distance Education program has a student population of 9,311, comprising 2,167 Level 100 students; 2,017 Level 200 students; 2,697 Level 300 students; and 2,430 Level 400 students. From the total population of 9,311 students and based on academic levels, a sample of 400 students were selected based on Krejcie & Morgan's (1970) method of determination of sample size, and using the stratified sampling method.

The questionnaire method was the main data collection tool. We utilized an amended version of Cheon et al (2012) questionnaire to investigate students' mobile learning readiness. In all, there were forty-five questions. The first section covered questions on the demographic characteristics

of students. The rest of the questions focused on: ownership and features of mobile phones; perceived ease of use (PEU) (three items); perceived usefulness (PU) (three items); attitudes (ATT) (two items); student readiness (three items); subjective norm (three items); perceived self-efficacy (three items); learning autonomy (three items); behavioral control (three items); and intention (five items). The study dropped questions on instructor's readiness because the use of m-learning has not started at the University. A five-point Likert scale was used to measure the responses on the interview schedule. The responses ranged from: *I strongly agree* – (1) to *I strongly disagree* – (5). The data collection was done in August when students were on the University of Ghana campus to write their semester examination.

DATA ANALYSIS

The data was analyzed using the SPSS version 16. Frequencies were computed for demographic characteristics, ownership of mobile phones and features on the mobile phones. Further analysis was conducted using factor analysis. The Kaiser-Meyer-Oklin (KMO) test for sampling adequacy and the Barlett Test of Sphericity were conducted. The KMO measure of 0.957 suggests that sample is adequate for carrying out a factor analysis. The Bartlett's test of sphericity was found to be significant, suggesting that the strength of the relationship among the variables is strong (χ^2 = 6556.0, *df* = 190, $p < 0.000$) showing evidence of adequate number of significant correlations among items to justify the conduct of factor analysis (Lu and Viehland, 2008). Table 1 shows the test of reliability results for the various constructs. The Cronbach alpha (α) values are deemed as acceptable based on the common threshold values recommended by accepted literature (Nunnally & Berstein, 1994).

Table 1: *Test of Reliability Results*

Constructs	No. of Item	Cronbach Alpha
Perceived Ease of Use (PEU)	3	0.785
Perceived Usefulness (PU)	3	0.885
Attitude (ATT)	2	0.805
Student Readiness (SR)	3	0.808
Subjective Norm (SN)	3	0.887
Self-efficacy (SE)	3	0.891
Learner Autonomy (LA)	3	0.897
Behaviour Control (BC)	3	0.910
Intention (INT)	5	0.895

FINDINGS

The demographic characteristics showed that the majority of students (79%) could be described as young students, 17% as middle-aged students, and 4.0% as older students. About 50.3% of participants in the study were males, while 49.7% forty-nine percent were females. As expected of a distance education program, about forty-two (42%) of students were workers, while fifty-eight (58%) of the students were not employed. The data revealed that 98.7% of students had mobile phones. Of those with mobile phones, the types of mobile phones are shown in Table 2. Over 50% of students owned more sophisticated phones.

Table 2: *Types of mobile phones owned by students*

Type of mobile phone	Frequency (f)	Percentage (%)
Classic cell phone (telephone only	78	20.7
Classic cell with digital camera and/or MP3 player	92	24.5
Smartphone with email and internet capability (e.g. Blackberry etc)	116	30.9
3G phone (e.g. Apple iPhone, Android etc)	90	23.9
	366	**100.0**

Table 3 shows that young students were more likely to own smart phones and 3 G phones than the more matured students.

Table 3: *Cross-tabulation of Type of mobile phones owned by Age*

	Classic cell	Cell/camera	Smart phone	3G phone
	F %	F %	F %	F %
Young students	64 (21.5)	61 (20.5)	94 (31.6)	78 (26.3)
Middle-aged students	8 (12.5)	28 (43.8)	18 (28.1)	10 (15.6)
Older students	6 (40.0)	3 (20.0)	4 (26.7)	2 (13.3)

$\chi^2 = 20.16$, $df = 6$, $p < .005$.

The study found that about 60% of students had laptops. Only a few of the students had iPod (8%), e-book reader (9.6%) and Tablet PCs (11.1%). Among the few students owning Tablet PCs, Level 100 and Level 200 students had a slightly higher percentage than their colleagues in Levels 300 and Level 400 (Table 4).

Table 4: *Cross-tabulation of level of students and ownership of Table PCs*

	Do you have a Tablet PC?	
Levels	**Yes**	**No**
	F %	**F %**
Level 100	17 (12.9)	115 (87.1)
Level 200	11 (14.3)	66 (85.7)
Level 300	9 (9.6)	85 (90.4)
Level 400	4 (6.0)	63 (94.0)

On the services and features which students often used on their mobile phones (Table 5), texting was the most frequent activity followed by listening to music, chatting and accessing social networking sites (Facebook, Twitter, YouTube etc.).

Table 5: *Services and features used often by students on their mobile phones to support their learning*

	Several times a day	Once a day	Few times a week	Few times a month	None
	F %	F %	F %	F %	F %
Sending and receiving e-mails	100 (27.6)	22 (5.9)	87 (23.5)	78 (21.1)	83 (22.4)
Sending and receiving text messaging	238 (63.8)	20 (5.4)	92 (24.7)	15 (4.0)	8 (2.1)
Chatting	198 (53.4)	15 (4.0)	37 (10.0)	21 (5.7)	100 (23.7)
Playing games	100 (27.0)	29 (7.8)	72 (19.4)	82 (22.1)	88 (23.7)
Listening to music	206 (55.2)	25 (6.7)	70 (18.8)	35 (9.4)	37 (9.9)
Accessing social network sites	197 (52.7)	28 (7.5)	57 (15.2)	28 (7.5)	64 (17.1)
Watching videos	94 (25.3)	33 (8.9)	100 (27.0)	55 (14.8)	89 (24.0)
Taking pictures	159 (42.9)	24 (6.5)	94 (25.3)	52 (14.0)	42 (11.3)

When asked to indicate which particular features of the mobile phones students had used to support learning in their distance education programs (Table 6), using the cell phone to make calls was very popular among students. Students also used the internet browser either on their phones or on their laptop computers to download learning materials. Text messaging was also used by students in their DE program. A few of the students use digital cameras to copy timetables and weekly activities posted on notice boards. Audio messaging such as Skype and use of Games were the least used by students in their DE programs.

Table 6: *Features used by Students in their DE program to support their learning*

	Once	Few times	Several times	Rarely
	F %	F %	F %	F %
Telephone	39 (10.5)	57 (15.4)	214 (57.7)	61 (16.4)
Digital camera	24 (6.5)	102 (27.6)	62 (16.8)	181 (49.1)
Emails	28 (7.4)	117 (31.5)	91 (24.5)	135 (36.4)
Internet browser	29 (7.8)	73 (19.7)	195 (52.6)	74 (19.9)
Text messaging	30 (8.1)	100 (27.0)	149 (40.2)	92 (24.8)
Audio messaging (e.g. Skype etc.)	18 (4.9)	55 (14.9)	33 (8.9)	264 (71.4)
Games	22 (6.0)	64 (17.4)	48 (13.0)	234 (63.6)

The majority of students said they would adopt m-learning if implemented next year (Table 7).

Table 7: *Planning to adopt m-learning next year*

	Frequency	Percent
Agree	275	73.1
Uncertain	53	14.1
Disagree	48	12.8
	376	**100.0**

Factor Analysis

A factor analysis was conducted to determine if the questions on m-learning readiness of students as adapted for this study could be grouped together. The reliance on the scree test led to the extraction of three components (Hayton, Allen & Scapello, 2004). The total percentage of variance for the cumulative value of the three factors was 66.6%. The principal axis factoring was used with the oblique rotation method using the default delta (0) (Costello & Osborne, 2005) because of its advantages over the orthogonal rotation approach (Matsunaga, 2010).

The pattern factor matrix generated showed salient loadings (Table 8). Factor loadings greater than [0.40] was relied upon which led to the extract of three factors. Factors items comprising Behavioral Control (BC), Intention (INT), Self-efficacy (SE), and Learning Autonomy (LA) loaded strongly on Factor 1, whereas, Social Norm (SN) and Student Readiness (SR) though loading on Factor 1, were not as strong as BC and INT. Items on Attitude (ATT) and Perceived usefulness (PU) loaded strongly on Factor 2. Items on Perceived Ease of Use (PEOU) loaded on Factor 3.

Students' perception of benefits and challenges on the adoption of M-Learning

In the questionnaire, students were asked to indicate the benefits or the potential uses and the challenges of mobile learning devices in teaching and learning. Some of the benefits mentioned by students were that adopting m-learning would help students them have easy access to course work and will also make learning easy. Students also noted that since the device to use would be easy to walk around with, it would enhance interaction and discussion more among students. According to one student "*Since I like to access my phone a lot at any time of the day, I would be moved to read whatever course materials installed on the device*." For another student "*It will solve the problem of delay of modules if the Acrobat Reader (pdf) files could be easily accessed online*."

With the challenges, the major issues students identified were, cost of the devices and the difficulties in getting money to buy some of the items to support learning. Other challenges mentioned were the irregular supply of power, intermittent network failures, security and privacy. Loss of mobile device means loss of course material and this can create problems for students. There was also the fear that "*Students who are not having smart phones would be left behind*." According to a student "*It will hamper my ability to use mobile technology in distance education because I come from a very remote area and have no access to the internet, it would be useful if the modules and the face-to-face tutorials are maintained because internet usage is not available throughout the country*." According to another student "*It might be difficult for some old folks who are not ready to adjust to technological changes*."

Table 8: *Pattern Matrix of M-learning Readiness Items*

	Factor		
	1	2	3
I have a sufficient extent of self-confidence to make decision to adopt m-learning	.917		
I intend to adopt a mobile device for university courses	.906		
I have a sufficient extent of control to make decision to adopt m-learning	.872		
I plan to participate in m-learning if introduced next year	.854		
I predict I would use a mobile device for my courses	.843		
I would have more opportunities to create knowledge in my coursework with a mobile device	.822		
I am confident about using a mobile device for my courses	.817		
I plan to use a mobile device if a course has mobile learning functions	.796		
I would be able to actively access coursework material with a mobile device	.795		
I would be comfortable to use a mobile device in my courses	.785		
I would be able to control the pace of learning in my classes with a mobile device	.757		
I think other students in my classes would be willing to adapt a mobile device for learning	.745		
I have a sufficient extent of knowledge to use m-learning	.739		
Most people who are important to me would be in favor of using a mobile device for university courses	.662		
I think the students would be in favor of utilizing m-learning in their course work	.623		
Most people who are important to think it would be easy to use mobile device for university courses	.510		
Using m-learning in my coursework is a wise idea		.855	
I believe that mobile devices would be useful for my learning		.827	
Using m-learning in my coursework would be a pleasant experience		.777	
I believe that using mobile devices would allow me get my work done more quickly		.724	
I believe that using mobile devices would improve my ability to learn		.523	
I believe that mobile devices would be easy to operate			.797
I believe that mobile devices would be easy to use			.718
I believe it would be easy to access course material with my mobile device			.549

Extraction Method: Principal Axis Factoring.
Rotation Method: Oblimin with Kaiser Normalization.

DISCUSSION

The adoption of m-learning in higher education has been found to enhance teaching and learning. The purpose of this study was to identify factors that may aid the adoption of m-learning among students, as well as the relationship among these factors. The study found that there was high penetration of mobile phones among the students. The study found that although over 50% of students owned more sophisticated mobile phones across groups and ages, young students compared to their more mature colleagues had more sophisticated mobile phones. In addition, the distribution of ownership of Tablet PCs was concentrated among students at Level 100 and Level 200, also confirming the use of mobile devices among the youth (Koszalka and Ntloedibe-Kuswani, 2010; Porter et al. 2012; Mohammad, Mamat and Isa, 2012; Makoe, 2012). Another significant finding is that about 60% of students have laptop computers.

Since Tablet PCs will be the main device to be used for m-learning at the University of Ghana, the study found that though a small population of students owned Tablet PCs, the few who owned them were distributed across the various levels, but showing a greater ownership among the young students. Most students used their mobile phones for communication (texting, chatting, and emails). Apart from making telephones and texting other students about tutorial periods and assignments, using the internet browser to download additional material and digital cameras to copy timetables, the use of games and Skype are the least used mobile devices to support teaching and learning.

The strong loading of behavioral control and intention to adopt m-learning from the factor analysis provide valuable insight into students' preparedness to receive m-learning. This finding is consistent with that of Cheon et al (2012) where they found that college students' behavioral control was a key determinant in their intention to adopt m-learning. The expressions of high levels of controllability and self-confidence in the decision to adopt the use of mobile learning devices should provide administrators the justification to introduce m-learning to accomplish educational goals. As stated by Shih and Mills (2007 cited in Cheon at el. 2012), mobile activities such as texting, making calls, internet browsing and taking pictures are familiar to students.

The findings of the study support the importance of the theory of planned behavior control in determining students' m-learning readiness and the need for more attention to be paid to control beliefs such as perceived self-efficacy and learning autonomy. Furthermore, the strong showing of attitudinal beliefs (perceived usefulness and perceived ease of use) also show that students who feel that m-learning is easy to use would adopt the device. This is because of the high penetration of mobile phone ownership among students (98.7%). One of the results of the study is the lower loading of the normative beliefs. This finding is consistent with that of Cheon et al. (2012) and that of Shuie (2007). Indeed, the theoretical implication is that whilst perceived behavioral control tend to influence intention to adopt m-learning, the same cannot be said about the normative beliefs.

CONCLUSION

The study aimed at determining students' m-learning readiness based on the theory of planned behavior. The study examined students' m-learning readiness as they prepare for the roll-out of the University's m-learning program for distance students. The results showed that the majority of students owned mobile phones. Younger students had sophisticated mobile phones than older students. Students used these for several activities. They copied time-tables with their phones and used it to social network. The female students used their phones to take pictures more than the male students. About 73.1% of students had the intention to adopt m-learning in teaching and learning in their distance education program. Although the majority of students did not own Tablet

PCs, the use of sophisticated phones is a strong indication of the acceptance of use of mobile technology among students. This is a positive influence in the adoption of m-learning devices at University of Ghana. The use of the TPB reveals the importance of attitude, subjective norm and behavioral control in understanding students' perceptions toward the adoption of m-learning. It is crucial for implementers of m-learning programs to understand what makes students accept the use or rejection of mobile devices and how to improve user acceptance of these devices. This study reveals that perceived behavior control with its dimensions, perceived self-efficacy and learning autonomy have strong influence on intention to adopt m-learning. This should help administrators of the distance education program develop plans for the implementation of m-learning.

Finally, implementers of the University of Ghana Distance Education m-learning program should ensure that they address some of the challenges of students. These include the cost of the devices, so that it will be easily accessed by students. Also, the new devices should be within the comfort level of students so that both young and more mature students will be able to use confidently. Because students are the end-users of the devices they need to be involved in the implementation process in order to guarantee their commitment and success of the program. These findings of the study should help in the design of more inclusive and user-accepted m-learning systems at the University of Ghana.

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